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field. The machine possesses great force, cutting a breadth of four feet at a time. The cutter can, at pleasure, be placed nearer to, or farther from the ground, and on a smooth and level field, it can be made to cut at any degree of closeness to the ground which may be desired.

SPONTANEOUS IGNITION.

The frequent accidents by fire in manufactories, have excited the attention of scientific men. By two papers published on this subject, one in the New-York Medical Repository, by Dr. Seybert, and Dr. Coxe, Professor of Chemistry, it appears, that a multitude of substances are capable of spontaneous inflammation, and that others evolve gaseous fluids, which suddenly inflame on the approach of fire. Among the articles mentioned by Dr. Seybert, are the following :

Candle-wick of hemp-yarn, accidentally impregnated with oil.

Cotton goods, on which linseed-oil has been spilled.

Roasted bran in a linen-cloth.

Wet hay, corn, and madder; especially if any portion of iron should be intermixed.

Sail-cloth, smeared with oil and ochre.

New cloth, and fire-wood soot immersed in hemp-oil varnish.

German lamp-black.

Vegetables boiled in oil or fat, and left to themselves, after being pressed.

Heaps of linen-rags in paper manufactories.

Pyrites, and cinders from the furnace of glass-works, when exposed to a moist atmosphere.

Cuttings of iron, which had been previously immersed in water.

Paint made of Derbyshire woad.

Specification of the Patent granted to John Justice, of Dundee, in North Britain, Ironmonger; for an improvement in the construction of stove-grates, calculated to prevent or cure smoky chimnies, and possessing other advantages over the stove grates in common use.

Dated March 6, 1810.

To all to whom these presents shall come, &c. Now know ye, that in compliance with the said proviso, I the said John Justice, do hereby declare, that the nature of my said invention is described in manner following; that is to say, The stove grates of my improved construction are in appearance similar to the register stoves in common use, but with the following additional conveniences or improvements. The grate, or that part which contains the fire, instead of being fixed and immoveable in its place between the outside cheeks, as in the stove grates or register stoves in common use, is moveable upwards or downwards between the outside cheeks, so that it may be lowered or sunk down even to the hearth when this is desirable, as where wood or turf is the fuel principally to be employed, or may be raised or wound up to any height desirable, and at the same time suitable to the inside opening of the front, presenting in this power of being moved and placed at any required height, the great advantage of enabling the possessor so to adjust it, as to cure, or altogether prevent, that evil so very generally complained of, commonly called a smoky chimney; for in most cases of smoky chimnies, the evil, as is well known to mechanics, may be remedied by bringing the top or lintel of the chimney down to some certain distance from the grate, which shall be found to occasion

precisely that draught of air which is necessary to carry up the smoke. But the method of remedy just mentioned, would often be found to produce such a deformity and want of proportion, as would be unbearable in an elegant room; nor would it be easy to adjust, without various trials, the height of the lintel precisely to produce the effect intended; but though the top of the lintel of the chimney cannot always be conveniently altered to produce the effect wanted, the height of the grate may with perfect convenience, and without producing any unpleasant appearance to the eye, and this is what I effect, and what constitutes the principal improvement in my said improved construction of stove grates.

Another improvement consists in giving motion by the same key that makes the grate to ascend or descend, to two or more plates of metal, fitted to the width of the front, and when not in use, kept out of sight, behind the top of the metal front; but those who prefer it, may use a distinct key and arrangement for this. These plates of metal answer the purpose of what is commonly called a blower, and are in fact a blower, differing in no respect from the blowers in common use, excepting only, that by being made in two or more pieces instead of one; but I commonly employ only two: they are made to slide one behind the other, so that the two occupy but half the space when up, that the blower would occupy, if made of one piece (but if the lintel be broad enough, the blower may be of one plate). This blower, by beginning to descend, after the grate in its ascent has reached a certain point, prevents the necessity of raising the grate to such an inconvenient height, (that is to any height displeasing to the eye,) as would sometimes be otherwise necessary, in cases where

the cure of a smoky chimney is difficult.

From the description already given, any competent workman would be enabled to construct my improved stove grate: for the methods of raising or lowering at pleasure any thing required, to be moved by mechanical means, may be varied without any inconvenience, according to the fancy of the workman, being, in fact, infinite in number, so that I do not rest my invention on the particular methods or mechanical contrivances that may be used to raise or lower the grate and the blower, or either of them, but on the giving an ascending or descending motion to the grate, or to the grate and blower.

But to enable any workman who hereafter may be employed to construct similar stove grates, I shall describe, as an example, one method of arranging the mechanical parts, which I have found in practice to answer very well. A slit should be cut in one of the outside cheeks, say in the right hand outside cheek, to allow a communication between the fire grate that is to be moved, and the apparatus employed to communicate the motion, the said apparatus being placed behind the cheek, out of sight, (though this is not indispensably necessary.) Having fitted the fire-grate, viz. the back and cheeks of the fire-grate to the back and cheeks of the outer, forming a stout bar, of sufficient strength to carry the weight of the fire-grate, it must be made fast to the said fire grate, in such a manner, and such form, that the said bar may come horizontally, or nearly so, through the slit before-mentioned, and then ascend, perpendicularly, behind the outer cheek. On that side or face of the ascending part of the said bar, which is next to, and parallel to the front of the grate, a rack should be cut (or a rack may

be attached securely to it). In this rack, a pinion or small wheel should work; and on the same axis, that carries the said pinion or small wheel should be a wheel, a little larger than the said pinion, with its teeth a little inclined, to receive motion from a worm; the outer end of the axis of which worm terminates in the front of the stove grate, and is squared, to receive the key employed to wind up or lower the fire-grate, or the fire-grate or blower, when a blower is also attached to the stove grate. When this arrangement is completed, the axis of the worm before-mentioned will be horizontal, and at the same time perpendicular to the face of the stove grate, and the axis of the wheel and pinion before-mentioned will also be horizontal, but parallel to the aforesaid face of the stove grate.

As the grate is raised or lowered by motion, communicated as has just been described, to an ascending or perpendicular bar attached to it, so the blower is also raised or lowered by motion, communicated to a bar connected with it by an elbow through a slit in the cheek, but this last-mentioned bar descends perpendicularly, instead of ascending like the one attached to the fire-grate. This ascending bar, on the side farthest from, but parallel to, the front of the stove grate, has a rack, which falls on that side of the pinion before-named, which is opposite to the part working in the rack of the ascending bar before-mentioned; that is, one pinion or small wheel works into the racks of both, and, of course, when the descending bar is in action, the motion of the two racked perpendicular bars are opposite and contrary, the one ascending while the other is descending. But the descending bar is not furnished with a rack throughout its

whole length, but only so much of it is so furnished, as the length of the space through which the plates of the blower are to descend; the said descending perpendicular bar is made fast only to one of the plates of the blower, namely, that one which is to descend lowest; the other plate descends by its own weight, and is furnished with two or more pins, which coming against stops, placed at a suitable height, prevents its descending lower, and keeps it stationary, while the other attached to the descending bar, continues to descend by the motion communicated by the rack, till, by its descent and the ascension of the grate, the two, viz. the blower and the grate, are brought close together, (if need be so,) that when in this position no air can enter the chimney without passing through the fire. When the blower is wound up, it will be seen, from the foregoing description, that the ascending bar carries up the lower plate, only of the blower, but the lower plate is furnished with two or more pins, which in its ascent come against stops in the upper plate; by which means the upper plate is also carried up, and both get out of sight behind the top or lintel of the front of the stove.

It is only necessary farther to state, that the descending perpendicular bar is kept suspended when not in action, (which it is convenient should be the case during some part of the rising of the fire-grate,) by means of a lever, the pin or fulcrum of which is fastened to the outside or back of the outer cheek. One end of this lever meets a pin projecting from the descending bar, while the other end is loaded with a counterpoise, able to sustain the weight of the descending perpendicular bar and the blower. This lever is placed in such a position, that the loaded end passes over the horizontal arm, by which the ascending

bar is attached to the fire-grate, so that when the fire-grate is down near the hearth, the lever is in action, keeping the descending bar at such a height, that the rack on the said bar is disengaged from the pinion, but when the fire-grate is wound up to a certain height, by turning the key, the horizontal arm of the ascending bar before-mentioned, reaches the loaded end of the lever, and in its ascent lifts up the said loaded end, suffers the descending bar to descend, and thus brings its rack into action with the pinion. A small bolt may be introduced, to carry the weight of the blower and its descending bar; by moving which bolt, the fire-grate alone, when this may be desirable, may be made to rise or fall without the blower being brought into action.

I have said nothing of fixtures or supports, in describing the before-mentioned apparatus, because they are precisely similar to what would be employed in any other machinery, to connect and support parts similar to those which I have described, as exemplifying the means that may be used to give an ascending or descending motion to the fire-grate, or fire-grate and blower, of my improved stove-grate. Which improved stove-grate I mean to distinguish, on account of its property of suffering the fire-grate to be raised and lowered, by the name of "The Patent Metastatic Stove Grate."

*On the Potash extracted from the Fruit of the *Æsculus Hippocastanum*, (the Horse Chestnut Tree,); by M. D'Arcet.*

[From the *Annales de Chimie*.]

Such great progress has been made in France, in the art of extracting soda from sea salt, and so much is it extended, that our soda works, although established only a few

years, could, if needful, furnish, at least, ten times the quantity that our manufactures consume; at the same time, as they are not taxed by government, the soda which they furnish bears such a moderate price in commerce, that the benefits of this valuable branch of trade is secured to the country. In this respect, therefore, we have nothing to desire; but there are still many instances in which soda cannot always be substituted for potash; consequently it is of importance, that all possible means be employed to fabricate in France the quantity of potash that is indispensable for our works of saltpetre, alum, soap, colours, crystals, glass, &c.

We know, that all burnt vegetables leave a saline earthy residuum, of which potash constantly makes a part.* It is from this abundant source, as well as from the sulphate produced from the muriate of potash and the lees of wine, &c., that this alkali must be extracted; but it must first be carefully ascertained what quantity of potash each species of plant, tree, or shrub, will furnish, and certainly a complete work of this kind, well executed, would furnish a multitude of facts, of great importance to the arts and sciences.

Chemists, who have hitherto been occupied in researches of this nature, have generally confounded the free or carbonated alkali with the divers soluble salts contained in the ashes of the plants, and have given the name of potash to this

* We find a considerable quantity of potash in the soda produced from seaweed, and the different species of marine plants that are collected on the sea shore, and especially in the richest sodas that are produced by the incineration of *salsola*, and by the pasty infusion of the ashes of this species of plant: the soda extracted from sea-salt has the advantage of containing much less.